CHAPTER 5

STABILIZATION WITH LIME-CEMENT-FLY ASH (LCF)

5-1. Reaction with soils. Stabilization of coarse-grained soils having little or no fines can often be accomplished by the use of the LCF combination. Fly ash is a pozzolanic material, consisting mainly of silicon and aluminum compounds that, when mixed with lime and water, forms a hardened cementitious mass capable of obtaining high compressive strengths. Thus, lime and fly ash in combination can often be used successfully in stabilizing granular materials having few fines since the fly ash provides an agent with which the lime can react. In addition to lime and fly ash, a small amount of portland cement is also added to accelerate and increase strength gain. ASTM C 593 provides guidance in the selection of fly ash.

5-2. Suitable materials. Types of materials suitable for the LCF stabilization are coarse-grained soils having no more than 12 percent of the material passing the No. 200 sieve. In addition, the PI of the minus 40 fraction should not exceed 25.

5-3. LCF content. ASTM C 593 should be used for the determination of mix proportions of the LCF except that in addition to lime and fly ash as indicated in the procedure, about 1 percent portland cement should also be added for strength. Minimum unconfined compressive strength requirements are indicated in table 2-1. If test specimens do not then meet strength requirements, add cement in increments of 1/2 percent until strengths are adequate. The total quantity of additives should not exceed 15 percent by weight. In frost areas, the LCF mixture should meet the weight loss criteria specified for cement-stabilized soils. ASTM D 560 should be followed except that the specimens should be compacted in accordance with the procedure described in MIL-STD-621, Method 100, Compaction Effort Designation CE-55. For mobilization, the use of ASTM D 560 may be altered to 6 cycles of 6 hours of freeze/wet - 6 hour thaw/dry. Percentages of stabilizer selected for use may be based on local performance history in lieu of these tests.